98TH CONGRESS
1st Session

SENATE

REPORT
No. 98-195

AUTHORIZING APPROPRIATIONS FOR THE NATIONAL SCIENCE FOUNDATION FOR FISCAL YEAR 1984

JULY 26 (legislative day, JULY 25), 1983.—Ordered to be printed

Mr. HATCH, from the Committee on Labor and Human Resources, submitted the following

REPORT

[To accompany S. 1087]

The Committee on Labor and Human Resources, to which was referred the bill S. 1087, to authorize appropriations for the National Science Foundation for fiscal year 1984 and for other purposes, having considered the same, reports favorably thereon with an amendment and recommends that the bill as amended do pass.

I. BRIEF SUMMARY

The bill authorizes appropriations for the National Science Foundation for fiscal year 1984 in the following categories and amounts:

Mathematical and physical sciences	$376,800,000
Engineering	135,500,000
Biological, behavioral and social sciences	223,600,000
Astronomical, atmospheric, Earth and ocean sciences	334,900,000
Antarctic research programs	102,100,000
Scientific, technological, and international affairs	39,300,000
Program development and management	66,000,000
Special foreign currency	2,600,000
Total	1,280,800,000

II. SECTION-BY-SECTION SUMMARY

Section 2

This section designates recommended funding levels for all NSF research and education activities for fiscal year 1984.

From the amounts authorized for the Mathematical and Physical Sciences Directorate and Engineering Directorate, $25,000,000 is authorized for an initiative in the field of supercomputers, including research centers, research on symbolic computers, and increased access and networking for numeric supercomputers.

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Section 3

This section stipulates that appropriations made for research, education and special foreign currency can be obligated throughout the period specified in the appropriations act.

Section 4

This provision limits the amount which can be spent on official consultation, representation, etc., to $2,500. Such expenditures can be made only at the discretion of the Director.

Section 5

This section authorizes NSF to draw $2,600,000 in foreign currencies for NSF expenses incurred outside of the United States.

Section 6

This section authorizes the Foundation to transfer funds from any one category to another as long as the amount is not greater than 10 percent of the authorization for the first category. If the proposed transfer is in excess of 10 percent, the Director must notify Congress and can effect the transfer only if there is no objection.

Section 7

This section states that the Foundation should keep the Senate Committee on Labor and Human Resources and the House Committee on Science and Technology fully informed of its activities.

III. Hearing

A public hearing was held on March 18, 1983 by the full Committee on Labor and Human Resources. The following individuals appeared to present testimony and respond to questions:

Dr. Edward A. Knapp, Director, National Science Foundation.

Dr. Lewis M. Branscomb, Chairman, National Science Board.

Dr. James J. Brophy, Vice President for Research, University of Utah, Salt Lake City.

Dr. Elinor Ostrom, Chairman, Department of Political Science, Indiana University, Bloomington.

Dr. Lattie Coor, President, University of Vermont, Burlington.

Dr. Shirley M. Malcom, Director, Office of Opportunities in Science, American Association for the Advancement of Science, Washington, D.C.

Dr. George Littleton, Associate Dean for Research, School of Arts and Science, Howard University, Washington, D.C.

IV. NSF Functions and Mandate

The National Science Foundation (NSF) is an independent Federal agency established by the National Science Foundation Act of 1950 to promote and advance scientific progress in the United States. NSF occupies a unique place among Federal Government agencies, with responsibility for the overall health and science instead of research directed to specific missions.

NSF support for research and science and engineering education is provided through grants, contracts, and other agreements awarded to more than 2,000 universities, university consortia, nonprofit, and

other research institutions. NSF encourages cooperative efforts by universities, industries, and government, but operates no in-house laboratories of its own. The Foundation accounts for more than 28 percent of Federal support for basic research going to academic institutions.

More than 30,000 scientists, engineers, and science educators assist NSF in determining the quality of research proposals each year. NSF staff members who are experts in science, engineering, or science education make award decisions on the more than 27,000 proposals received annually. Applicants can appeal award decisions.

A 25-member National Science Board establishes policies for the National Science Foundation within the framework of applicable policies made by the President and the Congress. The Board, the Director of the Foundation, the Deputy Director, and four of seven Assistant Directors are appointed by the President with the advice and consent of the Senate.

The Federal Government recognizes the support of research in all fields of science and engineering is important in maintaining the strength and well-being of the Nation. Research discoveries underlie advances in many important areas of Federal responsibility including national defense, industrial productivity, health, energy, environment and agriculture.

V. Program Description and Committee Views

The Committee recommends an authorization of $1,280,800,000 for fiscal year 1984. This figure is $11,500,000 less than the Administration's request of $1,292,300,000. The reduction is due to the transfer of funds for science and engineering education to a separate legislative proposal, S. 1285, the "Education for Economy Security Act." This transfer was partially offset by the addition of $25,000,000 for an initiative in supercomputers, and $2,500,000 for women and minorities programs. Overall, the Committee's recommendation is a 16.7 percent increase over the Foundation's fiscal 1983 current plan.

MATHEMATICAL AND PHYSICAL SCIENCE (MPS)

The objective of the Mathematical and Physical Sciences (MPS) activity is to increase fundamental understanding of the physical laws that govern the world and the universe in which we live. To achieve this objective, MPS uses a wide range of research support modes, including individual or group research projects, special instrumentation grants, university research laboratories and national user facilities, while supporting research across a spectrum of disciplines and scientific specialties. Support is provided for research in mathematics, computer science, physics, chemistry, and materials research.

The Committee recommends $376.8 million, an increase of $77.1 million for the Mathematical and Physical Sciences Directorate to strengthen research awards, address the critical problem of inadequate laboratory equipment and facilities, provide increased support for graduate students, postdoctoral fellows, and young investigators, and to increase the capacity for scientific computing. This increase is 25.7 percent over NSF's current fiscal year 1983 plan.

These funds will also be used for increased support of research, operations, and instrumentation at university laboratories and national user facilities including: the electron accelerator at the University of Illinois, a post accelerator at Florida State University; mathematics research centers at Princeton, New York University and the Universities of Minnesota, Wisconsin, California at Berkeley; Cornell University electron storage ring, Indiana University cyclotron, Michigan State University heavy ion accelerator system, and the national magnet laboratory at the Massachusetts Institute of Technology. Support for research at these sites, as well as for construction and maintenance of their systems and equipment, will account for $101.2 million of the MPS budget. An additional $20.3 million is allocated to the special equipment program for the acquisition of instrumentation of intermediate cost.

ENGINEERING (ENG)

The goals of the Engineering activity are to (i) advance fundamental knowledge of engineering principles that can be applied to the analysis and design of man-made devices, systems and processes; (ii) focus research attention in areas relevant to selected national problems; and (iii) strengthen the infrastructure of the engineering research community. While this activity provides some support for selected research facilities, it primarily funds individual research projects, including a special research initiation program for young investigators. It also works in close cooperation with the University/Industry Cooperative Research program supported under the Scientific, Technological and International Affairs (STIA) activity.

The Committee recommends $135.8 million, an increase of $34.7 million or 34 percent over fiscal year 1983 current plan. This increase is primarily to allow expansion of support for research in promising new areas such as biotechnology, optical communications, computer-aided design, electrochemical engineering, and unconventional separation processes. Support for research in civil, environmental, and mechanical engineering will also be increased to improve efforts in wastewater treatment, construction and building structures, thermal systems, robotics and earthquake engineering.

These proposed increases shall also take into account the instrumentation deficit that exists in engineering schools, as well as the critical shortage of faculty.

The Committee shares the opinion of the Administration that these areas of scientific inquiry deserve additional funding and emphasis. Basic research on these topics can help to ensure America's leadership in applied science and technological development. However, the Committee also wishes to note a human element among the activities of this NSF directorate. Science and Technology to Aid the Handicapped has long been a part of the Engineering Directorate with its own set-aside of funds. This year the Committee did not authorize this particular program as a set-aside of Engineering Directorate funds, though this decision should not be viewed as a deliberate action to minimize the importance of this NSF activity. The Committee expects the Foundation to follow through with its commitment to effectively staff this program and carry out its purposes.

BIOLOGICAL, BEHAVIORAL AND SOCIAL SCIENCES (BBS)

The objective of this activity is to increase basic understanding of life forms and life processes through research in biology, environmental sciences, cognitive and neural sciences, and economic and social science. Such research has led to new important knowledge on such topics as living organisms, human memory and learning, economic forecasting, and productivity measurements.

The Committee supports the fiscal year 1984 budget request for this Directorate of $223.6 million. This is an increase of $33.3 million, or 17.5 percent above fiscal year 1983 current plan.

Evidence presented to the Committee, and in other forums and publications, suggests that the scientific potential and economic payoff of the social and behavioral sciences has been underestimated in recent years. Over the next several years the Foundation is requested to make every effort to provide resources for the social and behavioral science programs to enable them to meet their scientific potential. While the Committee continues to stress the inappropriateness of federal support for projects which bear or promote particular values or opinions, it also encourages the Foundation to support social and behavioral science research yielding knowledge which currently, or will in the future, have broad applicability.

ASTRONOMICAL, ATMOSPHERIC, EARTH AND OCEAN SCIENCES (AAEO)

The objectives of the Astronomical, Atmospheric, Earth and Ocean Sciences activity are to (i) increase understanding of the physical nature of the universe; (ii) advance knowledge of the Earth's atmosphere; (iii) provide further insights into the physical and chemical composition of the Earth and its geologic history; (iv) improve knowledge of the world's oceans, and sea floor, and the living creatures they nurture; and (v) advance knowledge of natural phenomena in the Arctic. The activity provides support directly to individual investigators; it also supports major research facilities, including the National Center for Atmospheric Research and the National Astronomical Observatories.

The Committee supports the fiscal year 1984 budget request of $334.9 million for the AAEOS Directorate. This is an increase of $58.8 million over the fiscal year 1983 current plan, or 21.3 percent.

As with other directorates, AAEOS will emphasize the acquisition of new instruments and equipment for research in these scientific disciplines as well as the general increase in support of individual awards. Among other activities to be undertaken by this Directorate with this authorization level are design studies on the Very Long Baseline Array telescope, upgrading the computing center at the National Center for Atmospheric Research (NCAR), new emphasis on the evolution and structure of the continental crust, improvement of shipboard equipment for ocean science, and for increased research on arctic glaciers.

The Committee understands that the Ocean Drilling activity, formerly a separate directorate, has been integrated into the AAEOS activity for the purpose of integrating crustal studies with marine and

continental geology and geophysical research. Additionally, a study is in progress to assess the status of the Ocean Drilling sciences and make recommendations pertaining to their future direction.

The Committee urges NSF to complete this study as soon as is practicable and to transmit the findings to the Committee and to the House Science and Technology Committee. The Committee notes the many changes affecting the Ocean Drilling activity over the last several years and believes it is essential that the research priorities within the activity as well as its administration be given more stable moorings.

U.S. ANTARCTIC PROGRAM (USAP)

The National Science Foundation has been responsible for managing and funding the U.S. Antarctic Program since 1972. Both the President and the Congress have recognized that this responsibility is in addition to the usual activities of NSF. U.S. policy, most recently confirmed in a Presidential Memorandum of February 5, 1982, calls for the maintenance of an active, national presence in Antarctica.

The Committee agrees to the fiscal year 1984 budget request of $102.1 million, an increase of $18.9 million or 22.7 percent over the fiscal year 1983 current plan.

The Antarctic Program is in two tracks: operations support and research. The fiscal year 1984 budget request is justified to meet the increasing cost of maintaining the two coastal stations which are manned year-round and several remote locations. The Departments of Defense and Transportation (Navy and Coast Guard respectively) provide logistical support such as cargo and icebreaker support to NSF on a cost reimbursable basis. Additionally, as a signatory of the Antarctic Treaty, the United States, through NSF, participates in a number of other activities such as weather observations and forecasting, and mapping.

The Antarctic also provides a unique, pristine environment for scientists to understand biological, geological, meteorological, atmospheric, and oceanographic processes. Recommended support for the research component of the Antarctic program is $10 million, only a $1 million increase over fiscal year 1983.

SCIENTIFIC, TECHNOLOGICAL, AND INTERNATIONAL AFFAIRS (STIA)

The Scientific, Technological, and International Affairs activity supports and performs research and analysis to link performers of research with users of research (industry, small business, and State and local governments); exchange scientific and technical information internationally and facilitate international cooperation; serve science and technology decision makers and the public with policy-oriented data, information and analysis; and strengthen the science base by expanding opportunities for all qualified segments of the performing community to contribute to high quality research. STIA achieves these goals by supporting: joint research between universities and industry; small business innovation research; cooperative scientific activities with both advanced and developing countries; studies on the state of the research enterprise and its impact on the economy and society; and

programs which contribute to development of the Nation's science and engineering infrastructure.

The Committee recommends $39.3 million for this Directorate, which is a decrease of $4.9 million or 11 percent from the current fiscal year 1983 plan. This decrease reflects primarily a new management plan in effect at NSF; this plan will shift responsibility for project review and support for a number of STIA's subactivities to the separate research directorates.

The reductions in STIA were taken in the International Cooperative Science and the Research Initiation and Improvement programs of $4.9 million and $5.7 million respectively. The Industrial Science and Technological Innovation program was increased by $2 million, Policy Research and Analysis by $500,000, and Science Resource Studies by $700,000.

The Committee has agreed to this budget request with the understanding that the transfer of responsibility not result in shortchanging the programs affected by the new management policies.

The Committee also notes the continuation of the Ethics and Values in Science and Technology program at a modest level. The proliferation of new technologies leaves society with important questions regarding the right and wrong uses of such advances. Current issues such as compensation for the victims of disease due to above ground nuclear testing in 1950's, the implantation of an artificial heart, or the ability of children to perform mathematical functions studying the ethics and values of new advancements in science and technology.

PROGRAM DEVELOPMENT AND MANAGEMENT (PD&M)

The authorization for Program Development and Management is $66,000,000 or a net increase $687,596 over the fiscal year 1973 Current Plan. It provides for full funding of 1,194 full-time equivalent employment workyears, which is a reduction of 24 from the Current Plan. Funds budgeted for personnel compensation and benefits are reduced by $615,404 which is the net difference between the costs of the 24 full-time equivalent employment reduction and the annualized costs of the October 1982 pay increase, Medicare payments and the December 1982 lifting of the statutory limitation on Federal salaries. These items were funded in fiscal year 1983 for only that part of the year in which they were in effect.

The Committee agrees to the request due to increases in contract moving services, rents and communications costs (although no additional space will be rented), printing (due to increased costs of paper and printing supplies and price increases passed on to the Foundation by the Government Printing Office), and other contractual services such as building maintenance, office machine repairs, guard services, audits performed by other Federal agencies, data processing operations and software development contracts.

SPECIAL FOREIGN CURRENCY (SFC)

India and Pakistan are countries in which U.S.-owned foreign currencies are available "in excess" as determined by the Department of

the Treasury. These funds (special foreign currency) must be used within these countries and may be used for cooperative scientific and engineering research projects (Public Law 83–480 as amended). The Foundation seeks to strengthen the U.S. research effort by supporting mutually beneficial research projects in geology, chemistry, atmospheric sciences, engineering, physics, astronomy, the life sciences, and the social sciences involving U.S. and counterpart scientists in these countries. Binational workshops are supported to identify specific areas of mutual research interest. In addition, this activity supports U.S. foreign policy initiatives by funding projects conducted under the Indo-U.S. Joint Commission. It awards travel grants to U.S. scientists for participation in important international scientific congresses, conferences, and symposia in India and Pakistan. The National Science Foundation is the executive agency for the U.S.-India Exchange of Scientists agreements of 1966 and the signatory of a memorandum of understanding with the government of Pakistan.

For these duties, the Committee recommends $2.6 million which is a decrease of $518,067 from the current fiscal year 1983 plan.

OTHER NSF PROGRAMS AND POLICIES

Supercomputers

The Committee strongly endorses the addition of $25 million for fiscal year 1984, equally divided between the Mathematical and Physical Sciences Directorate and the Engineering Directorate, for an increased NSF effort in supercomputer research. The $25 million will be apportioned between symbolic and numerical supercomputers research, $15 million for symbolic supercomputers and $10 million for numerical supercomputers research and high band width network access.

Of the $15 million authorized for symbolic supercomputers research, not more than $10 million is authorized for the NSF to make grants to or enter into contracts with five institutions of higher education for the establishment and operation of research centers for research in symbolic supercomputers. These centers will: (1) provide funding for salaries and equipment for several principal investigators (2) provide support for an appropriate number of graduate student research assistants, (3) provide salary support for scientific programmers and electronics specialists, and (4) work on knowledge-based intelligence systems, parallel implementation of symbolic computing architectures and language, and any other expert system, fifth generation project, or artificial intelligence project deemed appropriate by the NSF through its peer review mechanization.

In establishing these centers, NSF is to give preference to those universities that have acquired a sufficient nucleus of excellent faculty capable of generating strong proposals and that are able to expand faculty and staff through their own educational efforts. Additionally, universities which are selected by the NSF should not have one of the four most advanced programs in the country as determined by the Director of NSF. It is the intent of the Committee to create new centers for symbolic supercomputer research which will not duplicate

the efforts of the four existing university centers, nor siphon off personnel from these centers.

Not less than $5 million of the amount authorized for symbolic supercomputer research shall be available for general symbolic research. These funds are to be available to all institutions of higher education and appropriate entities eligible for NSF funding, regardless of whether or not they have advanced programs in symbolic supercomputer research.

Ten million dollars are authorized for numerical supercomputer research and high bandwidth network access, which may include (1) increased research in computational mathematics, software, and algorithms, (2) research and development basic to the design and implementation of new supercomputer systems, and (3) supplements to the NSF budget for the coordinated experimental research program. The Committee intends that a substantial portion of such funds be allocated to provide researchers with greater access to university numerical supercomputer facilities, such as Colorado State University, University of Minnesota, and Purdue University. The Committee wants to assure that moneys allocated and granted for access to numerical supercomputers be actually spent for this purpose; hence, the NSF may wish to consider a plan similar to that used for the National Center for Atmospheric Research (NCAR) where grantees receive numerical supercomputer time units. The NSF could dispense the time units after purchasing them in bulk from the universities which have actual numerical supercomputers.

The Committee does not intend for any of the $10 million authorized for numerical supercomputers research to be spent on the actual purchase of a numerical supercomputer.

The Committee strongly urges the National Science Foundation to prepare a five-year funding plan, beginning in 1984, for university supercomputers operation and use, research and development, and interagency coordination. A five-year plan should ideally include a section on symbolic supercomputers and a section on numerical supercomputers, such as an examination of the need [X] [for increasing the number of numerical supercomputers installed in universities and for the networking of these machines.] The Committee understands that symbolic supercomputers are still in the research and development phase, hence no operation and use discussion can occur in other than a future sense.

The Committee suggests that the plan include a discussion of NSF's role in facilitating the nation's goals in this technological area and reference to the necessary collaboration with the private sector to enhance the transfer of technology and to focus the research.

The Committee recognizes that the establishment of centers for supercomputer research will require a longer term commitment than the single year authorization contained in this bill and suggests at least five years to determine the effectiveness of this approach. The Committee would encourage such appropriations in order to produce qualified scientists and first-rate research; centers should receive maintenance funds every year, as long as the peer review process demonstrates that a high quality program is in operation.

Management Plan

During the hearing on the NSF fiscal 1984 budget request, Dr. Edward Knapp, Director of the Foundation, testified that he intended to employ a new method of processing research proposals which had previously been segregated within the Foundation into special program offices with separate budgets. These programs have reviewed research proposals from all scientific disciplines. In an effort to mainstream these programs and assign administration of grants to the particular subject discipline, the Foundation has decreased funding for them in specific line items and has taken continued or increased support for the purposes of the programs into account when submitting its requests for all other directorates.

The Committee has no objection to the implementation of this management strategy, provided that the Foundation will abide by the priorities Congress has set and continues to reinforce. Reducing the number and amount of set-asides in the NSF budget is a worthy objective which the Committee is anxious to support. Such set-asides restrict the ability of qualified peer reviewers and program officers within the scientific discipline to which the proposal relates, to evaluate the project throughly and fairly. The basis of all NSF funding decisions is a comprehensive, competitive review.

However, the Committee stresses that the programs which were originally authorized as a set-aside were established in that manner for the assurance that NSF would carry out the intent of the Congress. NSF will be expected to produce satisfactory evidence that the management plan has not relegated these programs into oblivion. That the Committee is supportive of the new plan is not a license for the agency to subvert the importance the Committee attaches to those programs affected by it; a substantial measure of the new plan's success will be its ability to account for grants in the special categories while promoting the scientific goals of the directorate in a cohesive way.

Women and Minorities Programs

The Committee continues to be concerned about the shortage of qualified scientific and technical personnel and the apparent lack of attention to the potential contributions of women and minorities in these fields.

The Research Initiation and Improvement program (under the STIA Directorate) has been slated for delegation to all of NSF's research directorates. This subactivity includes the programs Congress has mandated to promote women and minorities in science and technology. The Committee is especially concerned that these initiatives not be lost in the management plan shuffle, and will, therefore, expect the Foundation to provide assurances that the goals of these programs are being carried out. Such assurances can be provided with the presentation of accurate data on the number of women who are recipients of grants awarded by the research directorates. The Committee also directs the Foundation to investigate methods of determining the number of women assisted indirectly through grants made to principal investigators, i.e., the number of women who are graduate or research assistants on research conducted on an NSF grant.

The Committee has also provided an additional $2.5 million to remain in the STIA Directorate for the women and minorities programs, $500,000 for Minority Research Initiation, $500,000 for Research Improvement at Minority Institutions, and $1.5 million for women's programs. The Committee has been pleased with the results thus far of the Visiting Professorships for Women program, but urges the Foundation to study the feasibility of other options for promoting women in science in addition to the Visiting Professorships. The Committee suggests a research program for women re-entering the scientific/academic community after an extended leave of absence for a purpose other than career related or a program of research grants for new female Ph. D.'s such as the National Research Opportunity Grants offered early in 1981. In addition to encouraging women in science, these programs also are based strictly on scientific merit.

Undergraduate Research

Two and four year colleges and universities play an important role in our nation's educational system and in the education of future professional scientists, engineers and mathematicians. A substantial number of students who pursue advanced degrees in science, mathematics, and engineering fields received their baccalaureate degreees at four year liberal arts colleges. Graduates of two and four year institutions also contribute to the scientific literacy of the nation, a fact which, though uncalculable, cannot be overlooked.

For these reasons, the Committee wishes to note the special importance of viable research programs at these undergraduate institutions. Support for undergraduate research instrumentation has been delegated to the research directorates along with support for undergraduate research. Undergraduate institutions, because they do not specialize, or offer advanced degrees, are too often ignored by the research establishment, or encounter a bias against the award of scarce federal funding to them. The Committee believes an undergraduate education in science which includes a well-equipped and stimulating research program is an essential prelude to successful graduate work and to a career in science or engineering, and directs the Foundation to give every consideration to those proposals from two and four year colleges and universities which will help not only to advance America's knowledge and understanding of science, but also to improve overall educational opportunity and excellence.

Instrumentation

For several years, the Committee has directed the Foundation, as well as other federal agencies conducting research programs, to give special emphasis to the acute problem of outdated and deteriorating instrumentation and facilities. The quality of research will be severely hampered by inaccurate or inoperative equipment. In terms of international competitiveness, America's efforts will be undermined if research in foreign nations in undertaken with the most modern instruments and computing services.

The Committee is gratified that the Administration has responded in an affirmative, decisive manner. Through its research directorates,

NSF has budgeted $180.2 million for instrumentation, a request the Committee readily grants. This authorization represents a 60 percent increase over the fiscal year 1983 current plan and a 100 percent increase from fiscal year 1982.

The Committee notes the testimony of witnesses at its March 18 and April 18 hearings that both engineering schools and two and four year colleges are in dire need of updated instructional equipment. This statement is not new; it is a repetition of previous pleas for assistance. While the Committee does not believe that the mere persistence of a complaint necessarily justifies action by NSF, it does, in this case, wholeheartedly agree that this need is legitimate, and directs the Foundation to give qualified proposals for the procurement of such equipment special consideration.

The Committee acknowledges that even $180 million is insufficient to solve the serious problem of inadequate research or instructural instrumentation. The problem will require a sustained multi-year commitment by government, universities and colleges, and the private sector.

Young Investigators

The Committee supports NSF's initiative to encourage young professors. More and more, young faculty are abandoning institutions of higher education for higher salaried positions in the private sector. Moreover, the same experience factor which is a barrier to women and minorities is also a barrier to young faculty in winning coveted NSF grants for research. The Presidential Young Investigators program, authorized at $6 million in fiscal year 1984, will provide this special category of researcher the opportunity to compete for research grants averaging $30,000 per year, to be matched by industry. The Committee understands that the private sector has endorsed this concept and that assurances have been given that the matching requirement can be met. The Committee shares the Administration's hopes for this program.

Science and Engineering Education

For many years, the National Science Foundation has played an important part in promoting science education for all levels of education, including precollege. Two years ago, at the Administration's request, Congress reduced this Directorate from $71 million to $21 million, and in fiscal year 1983, to $30 million with permission to carryover $15 milion contingent on NSF's submission of an approved plan. The purpose of these reductions was to permit the National Science Board an opportunity to re-assess the Foundation's role in science education, including the type and number of programs being administered by NSF and their impact on this great national need.

A National Science Board Commission, comprised of eminent private citizens from the fields of education, science, and business, was appointed to make recommendations for a thorough evaluation of NSF's efforts in science and engineering education.

In May 1983 the Committee on Labor and Human Resources reported a comprehensive, bipartisan bill to address the issues in science and mathematics education. The Education for Economic

Security Act, S. 1285, authorizes a total of $425 million in fiscal year 1984 and $540 million in fiscal year 1985 to the National Science Foundation and the Department of Education for programs to improve the teaching of math and science nationwide.

Because this measure includes an authorization of $75 million and $140 million for fiscal 1984 and 1985 respectively for NSF, the Committee agreed that the $39 million earmarked in the Administration's budget request for NSF programs in science and math education should be deleted from S. 1087. This deletion is intended to avoid the confusion and danger of duplication which occurs when funds are authorized in two bills for the same purposes. Therefore, no funds are authorized in S. 1087 for mathematics and science education, a fact which should not be construed to mean that the Committee does not support a defined role for NSF, or for the scientific resources of the nation, in improving science education at the precollege level as well as at the undergraduate and graduate levels.

VI. Budget Estimate

U.S. Congress,
Congressional Budget Office,
Washington, D.C., May 20, 1983.

Hon. Orrin G. Hatch,
Chairman, Committee on Labor and Human Resources, U.S. Senate, Dirksen Senate Office Building, Washington, D.C.

Dear Mr. Chairman: Pursuant to Section 403 of the Congressional Budget Act of 974, the Congressional Budget Office has prepared the attached cost estimate for S. 1087, the National Science Foundation Authorization Act for Fiscal Year 1984.

Should the Committee so desire, we would be pleased to provide further details on this estimate.

Sincerely,

Alice M. Rivlin, *Director.*

Congressional Budget Office—Cost Estimate

1. Bill number: S. 1087.
2. Bill title: National Science Foundation Authorization Act for Fiscal Year 1984.
3. Bill status: As reported by the Senate Committee on Labor and Human Resources, May 16, 1983.
4. Bill purpose: This bill authorizes the appropriation of $1,281 million to the National Science Foundation (NSF) for fiscal year 1984. Of this amount, $1,278.2 million is authorized for research and related activities, and $2.6 million is authorized for the special foreign currency program. Funding levels for certain programs within the research and related activities authorization are also specified.

In addition to these provisions, the bill grants the foundation's director limited authority to transfer funds to other areas, permits the Director of the NSF to apportion funds between the mathematics and physical science directorate and engineering directorate as he deems

appropriate, and limits the level of funding available for numerical supercomputer research.

The $1,281 million authorized by this bill is $11 million lower than the President's 1984 budget request for the NSF. This figure is significantly higher than the amount provided to the agency in 1983, however, largely as a result of additional funds for physical sciences and engineering research.

5. Estimated cost to the Federal Government:

	Millions
Authorization level:	
Fiscal year:	
1984	$1,281
1985	------
1986	------
1987	------
1988	------
Estimated outlays:	
Fiscal year:	
1984	652
1985	440
1986	115
1987	73
1988	(1)

[1] Less than $500,000.

If outlays from prior year appropriations are included, CBO estimates that 1984 outlays for the NSF programs covered by the bill would total $1,151 million.

The costs of this bill fall within budget function 250.

Basis of estimate: It was assumed for the purposes of this estimate that all amounts authorized will be appropriated and that the funds will be distributed among individual programs as specified in the bill. The estimated level of outlays is based on historical spending patterns for NSF programs.

6. Estimated cost to State and local governments: None.

7. Estimated comparison: None.

8. Previous CBO estimate: On March 30, 1983, CBO prepared a cost estimate for the Senate Committee on Science, Commerce and Transportation for a bill authorizing appropriations to the NSF in 1984. The level of funding authorized by that bill was identical to the President's budget request for the agency ($1,292 million), and $11 million higher than the amount authorized by S. 1087.

9. Estimate prepared by: Charles Essick.

10. Estimate approved by:

C. G. Nuckols
(For James L. Blum,
Assistant Director for Budget Analysis).

VII. Regulatory Impact

In accordance with paragraph (5)(a) of Rule XXIX of the Standing Rules of the Senate, the following statement of regulatory impact of S. 1087 is made:

This measure represents a one year extension of existing NSF programs and activities and proposes specific levels of funding. There is

no additional regulation anticipated as a result of the enactment of this legislation.

VIII. Committee Action

The Committee on Labor and Human Resources met on May 4, 1983 to consider S. 1087, a bill to authorize appropriations for the National Science Foundation for fiscal year 1984. The Committee considered the bill and the following amendments:

An amendment offered by Mr. Hatch to delete the authorization for Science and Engineering Education was passed 17–0; Mr. Humphrey voted "present".

An amendment offered by Mr. Kennedy to add $2.5 million to the Scientific, Technological and International Affairs Directorate for women and minorities programs was passed on a vote of 15–3, senators voting as follows:

YEA	NO
Mr. Hatch	Mr. Nickles
Mr. Stafford	Mr. Humphrey
Mr. Quayle	Mr. East
Mr. Denton	
Mr. Weicker	
Mr. Grassley	
Mrs. Hawkins	
Mr. Kennedy	
Mr. Randolph	
Mr. Pell	
Mr. Eagleton	
Mr. Riegle	
Mr. Metzenbaum	
Mr. Matsunaga	
Mr. Dodd	

An amendment by Mr. Kennedy to add $40 million for a new program for research in supercomputers was rejected on a vote of 8–10, senators voting as follows:

YEA	NO
Mr. Kennedy	Mr. Hatch
Mr. Randolph	Mr. Stafford
Mr. Pell	Mr. Quayle
Mr. Eagleton	Mr. Nickles
Mr. Riegle	Mr. Humphrey
Mr. Metzenbaum	Mr. Denton
Mr. Matsunaga	Mr. Weicker
Mr. Dodd	Mr. Grassley
	Mr. East
	Mrs. Hawkins

An amendment by Mr. Kennedy to add $25 million, divided equally between the Mathematics and Physical Sciences and Egineering Directorates, for a program of research in supercomputers was adopted on a vote of 13–5, senators voting as follows:

YEA	NO
Mr. Hatch	Mr. Nickles
Mr. Stafford	Mr. Humphrey
Mr. Quayle	Mr. Denton
Mr. Weicker	Mr. Grassley
Mrs. Hawkins	Mr. East
Mr. Kennedy	
Mr. Randolph	
Mr. Pell	
Mr. Eagleton	
Mr. Riegle	
Mr. Metzenbaum	
Mr. Matsunaga	
Mr. Dodd	

The Committee subsequently voted 17–1 (Mr. Nickles dissenting), to report the bill, S. 1087, as amended, to the Senate with a favorable recommendation.

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